

CLAIMS

1. An optical film for a liquid crystal display obtained by laminating a polarizing plate and a retardation film so that an absorption axis of the polarizing plate and a slow axis of the retardation film are perpendicular or parallel to each other,
5 wherein the polarizing plate comprises a transparent protective film on both surfaces of a polarizer and if a direction on the transparent protective film in which an in-plane refractive index is maximized is X axis, a direction perpendicular to X axis is Y axis, a direction of the film thickness is Z axis; and refractive indexes at 550 nm in the respective axes directions are nx_1 , ny_1 and nz_1 ; and a thickness of the film is d_1 (nm) by 10 definition,
15 an in-plane retardation $Re_1 = (nx_1 - ny_1) \times d_1$ is 10 nm or less and
a thickness direction retardation $Rth = \{(nx_1 + ny_1)/2 - nz_1\} \times d_1$ is in the range of from 30 nm to 100 nm, and
wherein if a direction on the retardation film in which an 20 in-plane refractive index is maximized is X axis, a direction perpendicular to X axis is Y axis, a direction perpendicular to X axis is Y axis, a direction of the film thickness is Z axis; and refractive indexes at 550 nm in the respective axes directions are nx_2 , ny_2 and nz_2 ; and a thickness of the film is d_2 (nm) by 25 definition, the following relations are satisfied:

an N_z value represented by $N_z = (nx_2 - nz_2)/(nx_2 - ny_2)$ is in the range of from 0.1 to 0.8 and

an in-plane retardation $Re_2 = (nx_2 - ny_2) \times d_2$ is in the range of from 60 to 300 nm.

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2. The optical film according to claim 1, applied to an IPS mode liquid crystal display comprising a liquid crystal cell driven in IPS mode.

10 3. The optical film according to claim 2, wherein the liquid crystal cell driven in IPS mode is a liquid crystal cell in IPS mode having a retardation value in the range of from 230 to 360 nm at 550 nm when no voltage is applied.

15 4. A transmissive liquid crystal display comprising: a liquid crystal cell containing a pair of substrates between which a liquid crystal layer is sandwiched, and driven in IPS mode; and a pair of polarizing plates disposed on both sides of the liquid crystal cells so that an absorption axis of the polarizing plates 20 are perpendicular to each other,

wherein at least one of the polarizing plates is an optical film according to claim 2 or 3, and the optical film is disposed so that an retardation film sides face the liquid crystal cell.

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5. The transmissive liquid crystal display according to
claim 4,

wherein the optical film according to claim 2 or 3 is
5 disposed on a cell substrate on the viewing side, and
an extraordinary refractive index direction of a liquid
crystal material in the liquid crystal cell when no voltage is
applied and an absorption axis of the polarizing plate on the light
incidence side are parallel to each other.

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6. The transmissive liquid crystal display according to
claim 4,

wherein the optical film according to claim 2 or 3 is
disposed on a cell substrate on the light incidence side, and
15 an extraordinary index direction of a liquid crystal
material in the liquid crystal cell when no voltage is applied and
an absorption axis of the polarizing plate in the optical film are
perpendicular to each other.

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7. The transmissive liquid crystal display according to
claim 5 or 6, wherein the optical film comprises a polarizing
plate and a retardation film so that an absorption axis of the
polarizing plate and a slow axis of the retardation film are
perpendicular to each other.

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**8. The transmissive liquid crystal display according to
claim 4,**

5 **wherein the optical film according to claim 2 or 3 are
disposed on a cell substrate on the viewing side and the light
incidence side, and**

10 **an extraordinary index direction of a liquid crystal
material in the liquid crystal cell when no voltage is applied and
an absorption axis of the polarizing plate in the optical film on
the light incidence side are parallel to each other.**

15 **9. The transmissive liquid crystal display according to
claim 8, wherein the optical film comprises a polarizing plate and
a retardation film so that an absorption axis of the polarizing
plate and a slow axis of the retardation film are parallel to each
other.**

20 **10. The transmissive liquid crystal display according to
claim 8 or 9, wherein an in-plane retardation Re_2 of the
retardation film in the optical film disposed on the cell substrate
on the light incidence side is smaller than an in-plane
retardation Re_2 of the retardation film in the optical film
disposed on the cell substrate on the viewing side.**